

the muscular epithelium. Schultze regards the threads (*cnidocils*) of the urticating organs as organs of touch. The study of *Lucernaria* has enabled me to extend Schultze's observations: the heads of the tentacles of the animal in question are covered with nematocysts (urticating organs). Each nematocyst is placed in a cell, which bears a thread. This cell is produced into a long fibril, which traverses another bipolar or multipolar cell. The fibril in question terminates by a small peduncle, which penetrates into the *membrana propria*. The multipolar cell may be regarded as a nervous cell. The analogy with the tactile organs of the Arthropoda is complete. Between these tactile organs there are long glandular cells filled with a mucous substance, which enables the *Lucernaria* to attach itself by its tentacles.

The digestive cavity contains a stomach and four wide radial canals; the walls of this cavity are clothed with a layer of entodermic cells, which are ciliated on the peristome and simple on the outer walls of the body. Among the entodermic elements there are unicellular flask-shaped glands, which secrete a digestive fluid. The surface of the cavity above mentioned is increased by mesenteric filaments. One side of each filament is formed by glandular cells, whilst the other is ciliated. I suppose that the ciliated cells serve to produce a circulation in the cavity, and the simple entodermic cells absorb the nutritive liquid.

The sexual elements are developed in special capsules of entodermic origin. Each capsule is composed of the entoderm and of an elastic membrane (*membrana propria*); the interior of the capsule is filled with ovigenous cells; the young ovum has a large germinal vesicle, which disappears as it enlarges. The developed ovum is surrounded by a strong membrane with a large micropyle. The mature capsule is furnished, near its base, with a duct, which serves for the issue of the sexual products; this duct is closed, which is due to the elasticity of the *membrana propria*. The pressure of the mature ova from the interior opens the duct; a few ova issue, and the duct closes again.—*Comptes Rendus*, November 8, 1875, p. 827.

Instinct(?) in Hermit Crabs. By ALEXANDER AGASSIZ.

While tracing the development of one of our species of hermit crabs I raised from very young stages a number of specimens till they reached the size when they need the protection of a shell for their further development. I was, of course, curious to see how they would act when first supplied with the necessary shells. For this purpose, a number of shells, some of them empty, others with the animal living, were placed in the glass dish with the young crabs. Scarcely had the shells reached the bottom before the crabs made a rush for the shells, turned them round and round, carefully examining them, invariably at the mouth; and soon a couple of the crabs decided to venture in, which they did with remarkable alacrity: and

after stretching backward and forward, they settled down into their shells with immense satisfaction. The crabs who were so unfortunate as to obtain for their share living shells, remained riding round upon the mouth of their future dwelling, and on the death of the mollusk, which generally occurred soon after in captivity, commenced at once to tear out the animal, and having eaten him, proceeded to take his place within the shell.

It is, of course, very difficult to apply to Invertebrates many of the laws of natural selection; and thus far we know so little of the habits of most of our marine animals, that it is idle to speculate upon the effect of causes which may effectually modify the life of higher animals. In the case above mentioned, there is no possible connexion between the embryo and the parent to account for the young having learned from the former the use of the shell and its value for his existence. We can therefore only explain the faculty of performing this act as inherited, or else as a simple mechanical act rendered necessary by the conditions of the young hermit crab. The latter seems the more probable case from the nature of the test of the hermit crab in its younger stages. While the young hermit crab, soon after leaving the egg, is still provided with its powerful temporary swimming-feet, and while the feet of the adult can only be traced as mere rudiments behind them, the whole test of the cephalothorax and abdomen (which are symmetrical) is of considerable consistency up to the last moults preceding the stage when it seeks a shell. At that time the young are no longer symmetrical, the feet, which are now fully developed, being largest on the right side, and the abdomen beginning to curve in the same direction away from the longitudinal axis. When the moult has taken place which brings them to the stage at which they need a shell, we find important changes in the two hind pairs of feet, now changed to shorter feet capable of propelling the crab in and out of the shell; we find also that all the abdominal appendages except those of the last joint are lost: but the great distinction between this stage and the one preceding it is the curling of the abdomen; its rings, so distinctly marked in the previous stages, are quite indistinct, and the test covering it is reduced to a mere film, so that the whole abdomen becomes of course very sensitive. It is therefore natural that the young crab should seek some shelter for this exposed portion of his body; and, from what I have observed, any cavity will answer the purpose—one of the young crabs having established himself most comfortably in the anterior part of the cast skin of a small isopod, which seemed to satisfy him as well as a shell, there being several empty shells at his disposal. This mechanical explanation still leaves unanswered the eagerness with which the crabs rushed for the shells, their careful examination of the openings, their taking the animal out and occupying its place—all acts which seem to require considerable intelligence(?) and to show remarkable forethought(?).—*Silliman's American Journal*, October 1875.

Newport, August 23, 1875.